LAPAROSCOPIC LIVING DONOR NEPHRECTOMY IN INDONESIA

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ABSTRACT

Objective: *To evaluate and analyze variables related to the surgical and direct post-operative outcomes of our initial experience of laparoscopic living donor nephrectomies (LLDN).* ***Material & methods:*** *This retrospective analysis describes the first 10 laparoscopic nephrectomies in living donors performed in Cipto Mangunkusumo Hospital. All surgeries were performed by the same surgical team. Variables related to the surgical and post-operative outcome and complications in donors were evaluated and analyzed.* ***Results:*** *The average age of the donors was 31.8 years with male : female ratio of 7 : 3. Thirty percent of them were family related to the recipient. The left kidney was extracted from all patients and multiple renal vessels were found in one cases. The mean operation time was 321.9 ± 27 min, first warm ischemia time was 9.37 ± 3.34 min and estimated blood loss was 270 ± 182.87ml. The hospital stay was 4.1 ± 1.3 days, VAS in the first day post surgery was 3 ± 1 with epidural analgesia needed for 1.8 ± 0.6 days, and drain was kept in for 2.8 ± 1.2 days while urethral cathether for 2.4 ± 1.2. Time to return to work was 16 ± 8.4 days.* ***Conclusion:*** *LLDNresults in acceptable blood loss, less post-operative pain, short hospital stay and short time to return to work for the donors, therefore promising to be the gold standard among living donor nephrectomy surgical options.*

Keywords: *Laparoscopic living donor nephrectomy, renal transplantation, Indonesia.*

ABSTRAK

Tujuan: *Mengevaluasi dan menganalisa variabel yang berhubungan dengan pembedahan dan hasil pasca-operasi laparoscopic living donor nephrectomies (LLDN).* ***Bahan & cara:*** *Analisa retrospektif ini menjelaskan 10 laparoskopik nefrektomi pertama pada donor hidup yang dilakukan di RS Cipto Mangunkusumo Jakarta. Semua pembedahan dilakukan oleh tim bedah yang sama. Variabel yang berhubungan dengan pembedahan dan hasil paska-operasi dan komplikasi pada donor dievaluasi dan dianalisa.* ***Hasil:*** *Rerata usia pendonor 31.8 tahun, dengan rasio laki-laki : wanita adalah 7 : 3. Sebanyak 30% dari pendonor adalah keluarga para pendonor. Ginjal kiri diekstrak dari semua pasien dan multiple renal vessels ditemukan ada 1 kasus. Rerata waktu operasi adalah 321.9 ± 27 min, waktu warm ischemia pertama adalah 9.37 ± 3.34 min dan estimasi kehilangan darah adalah 270 ± 182.87 ml. Waktu tinggal di RS adalah 4.1 ± 1.3 days, VAS pada hari pertama pasca operasi adalah 3 ± 1 dengan epidural analgesia dibutuhkan untuk 1.8 ± 0.6 hari, dan drain selama 2.8 ± 1.2 hari sementara kateter uretra selama 2.4 ± 1.2. Waktu kembali bekerja adalah 16 ± 8.4 hari.* ***Simpulan:*** *LLDN memberikan hasil kehilangan darah yang tidak banyak, luka paska-operasi yang lebih sedikit, waktu tinggal di RS yang pendek, dan waktu kembali bekerja yang lebih pendek bagi pendonor, oleh karena itu menjanjikan sebagai gold standard diantara pilihan pembedahan nefrektomi donor hidup.*

Kata kunci: *Nefrektomi donor hidup laparoskopi, transplantasi ginjal, Indonesia.*

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INTRODUCTION

Since the first successful kidney transplant in 1954, kidney transplant continues to grow until today it has become the primary management/treatment of choice in patients with end-stage renal disease (ESRD).[1] However, although kidney transplant procedure has been proven to be successful for more than 50 years, there is still a gap between the number of patients with end-stage renal disease with renal transplants that had been performed. This is mainly caused by the imbalance between demand, which represents the number of patients with end-stage renal disease and the availability of kidneys.[2]

Various attempts have been made to increase the availability of kidneys, such as by developing

various techniques of kidney transplant surgery. The source of kidney availability, in addition from a cadaver, is from a living donor. Living donors are now regarded as a promising potential to increase the number of available kidneys.[3] A variety of surgical procedures on the donor kidney is being developed to provide comfort and little complications after surgery on the donor.

Although living donor kidney removal with the classical surgery method is a quite safe procedure with a mortality rate of 0.03%, the procedure has few complications, such as acute or chronic pain due to surgical wound, surgical wound infections, the risk of incisional hernia, longer hospital stay and delayed return to normal activity. The incidence of these complications varies with the range of 15-20% or more.[4,5]

In 1995, to reduce complications experienced by the donors, for the first time Ratner et al. successfully developed kidney removal in living donor with laparoscopic method. Various studies conducted afterwards showed that laparoscopic living donor nephrectomy (LLDN) has various advantages over classical surgical procedures, such as better cosmetics, lighter pain, shorter duration of hospital stay, and the patient returns to normal activities more quickly. On the other hand, the function of donor kidneys removed with LLDN method also does not show different outcome from those removed with classical surgical method.[2,3,6,7]

With a variety of advantages, LLDN now become the method of choice to remove the donor kidney, which is widely used around the world. In 2005, 40% of living donor kidney removal in Europe was performed with LLDN, while in 2003 in the United States living donor kidney removal using LLDN reached 67%. With milder postoperative pain, shorter hospitalization time, shorter time to reactivate life, and various other convenience for donors, LLDN is believed to increase the motivation and the number of living donors.[3,6]

In Indonesia kidney transplant procedures have been performed since 1977, and up to now more than 300 procedures have been performed.8 This figure is much less when compared with kidney transplantation in the United States. Donor kidney removal procedure in Indonesia in general is still using classical surgical method. To reduce the risk of complications and to improve donor comfort, Cipto Mangunkusumo Hospital (RSCM) has started to develop donor kidney removal with laparoscopic method, which in turn is expected to increase the number of living kidney donors.

OBJECTIVE

This study aimed to evaluate and analyze variables related to operation and post-operative outcome at 10 early experiences in the application of LLDN at Cipto Mangunkusumo Hospital, Jakarta, Indonesia.

MATERIAL & METHOD

Clinical and operation data were obtained from medical records of the first 10 patients who underwent Laparoscopic Living Donor Nephrectomy (LLDN) the procedure in Cipto Mangunkusumo Hospital (RSCM), Jakarta, Indonesia. The analyzed variables were age, family relationships, warm ischemia time, operation time, bleeding during surgery, complications during treatment, hospitalization time, and a length of time to return to work.

RESULTS

The characteristics of kidney donors who underwent LLDN in RSCM were male-dominated with the ratio of male : female was 7 : 3, and the average age of 31.8 ± 8.4 years (table 1). Average weight of the donors was 63.8 ± 8.2 kg with average BMI was 23.23 ± 3.33. Only three (30%) of the donors had family relationship with the recipient. Donated kidney was taken from the left side of the all kidney donors.

Table 1. Demographic data.

Parameters		
Age	31.8 ± 8.4 years	(19-47)
Male : female ratio	7 : 3	
Kinship	30% related	(n = 3)
Nephrectomy side	100% left	
Bodyweight	63.8 ± 8.2 kg	
BMI	23.23 ± 3.33	

Length of operation with LLDN took an average time of 321.9 ± 27.0 minutes with a range of 277-364 minutes. The average warm ischemia time 1 was 9.37 ± 3.34 minutes, followed by cold ischemia with an average of 29.17 ± 15.23 minutes, then warm ishemia 2 with an average of 52.26 ± 7.56 minutes.

The average time of urine discharge was 6.82 ± 8.39 minutes. Average intraoperative bleeding was 270 ± 182.87 mL. Of 10 LLDN procedures performed, there was one case complicated with multiple renal arteries (table 2).

From table 3, a total of 4 (40%) donors had urinary retention complications, whereas infection of wound drain occurred in 2 (20%) donors. One case needed postoperative transfusion, but there were no complications that lead to death. Pain score on the first postoperative day had an averaged VAS 3 ± 1. Bupivacaine 0.125 mg and 10 mg morphine were given epidurally to all donors with an average length of 1.8 ± 0.63 days. The use of postoperative drain was performed on all donors with an average length of 2.8 ± 1.2 days of use and production of 161 ± 100.49 cc. Urinary catheters were used in all donors with an average length of 2.4 ± 1.2 days of use. Average length of stay in the hospital was 4.1 ± 1.37 days, and an averagely in 9.0 ± 5.91 days the donors were able to return to normal activities at home. The length of time to go back to work was averagely 15.8 ± 7.94 days.

During the hospitalization, on the first day as many as 80% of the patients received soft diet, while on the second day as many as 90% of the patients received solid food, and 100% on the third day. In terms of mobilization, on the first day post-surgery, all the donors could sit, on the second day 70% of the donors could walk, and it increased to 90% on the third day (table 4).

DISCUSSION

The average age of donors who underwent LLDN in this study was 31.8 ± 8.4 years and can be

Table 2. Intraoperative data.

Parameters		
Operation time	321.9 ± 27.0 min	(277-364)
Warm ishemia 1 time	9.37 ± 3.34 min	(4.88-15.5)
Cold ischemia time	29.17 ± 15.23 min	(14.6-68.4)
Warm ishemia 2 time	52.26 ± 7.56 min	(40.85-63)
Urine discharge time	6.82 ± 8.39 min	(0.91-29.25)
Intraoperative bleeding	270 ± 182.87 mL	(100-600)
Multiple renal arteries	10 %	(n = 1)

Table 3. Postoperative data.

Parameters		
Donor with one or more post-operative complications	60%	(n = 6)
Infection on drain site	20%	(n = 2)
Retention	40%	(n = 4)
Post-op. blood transfusion	10%	(n = 1)
VAS H+1	3 ± 1	(2-4)
Epidural analgesia*	1.8 ± 0.63 days	(1-3)
Drain production	161 ± 100.49 cc	(10-350)
Length of drain use	2.8 ± 1.2 days	(2-6)
Length of catheter use	2.4 ± 1.2 days	(2-4)
Length of hospital stay	4.1 ± 1.37 days	(3-6)
Length to regain normal activity at home	9.0 ± 5.91 days	(4-21)
Length to go back to work	15.8 ± 7.94 days	(6-30)
Death due to the operation	0%	(n = 0)

*Analgesic used was Bupivacaine 0.125 mg and 10 mg morphine.

Table 4. Diet and mobilization during hospitalization.

Parameters	H+1	H+2	H+3
Diet	80% soft ; 20% solid	10% soft ; 90% solid	100% solid
Mobilization	100% sit	30% sit ; 70% walk	10% sit ; 90% walk

categorized as young adults. Whereas, the average BMI was 23.33 ± 3.33, classified as normal. Older age donors are still subjected to dispute, because there has been reported a physiological decline in glomerular filtration and an increased risk of intra- and postoperative complications.[6] However, several studies reported that LLDN procedure can be performed on donors over the age of 60 years with good results.[1,9] Now the consensus of the experts transplants in the UK recommends that age alone is not an absolute contraindication, but donors aged over 60 years should undergo a thorough suitability assessment as a donor.[6]

Obesity is not a contraindication for LLDN procedure. However, donors with obesity should undergo a thorough preoperative evaluation to rule out cardiovascular, respiratory, and kidney diseases. This is because obesity is associated with an increased risk of perioperative complications.[1,6]

Donated kidneys in this study were taken entirely from the left side. Left kidney is generally preferred because the renal veins is longer. In addition, LLDN is also more difficult for the right kidney because the presence of the liver blocks and complicates the surgical field.[1,4,6] However, research conducted by Boorjian et al. (2004) showed that the right kidney can also be used in LLDN safely, and they found no differences in morbidity and remarkable impairment of renal function than that using the left kidney.[10]

The average length of LLDN surgery in this study was 321.9 ± 27.0. Four years after introducing LLDN for the first time, Ratner published his experience. The average length of LLDN surgery performed by Ratner et al. was 230 ± 29 minutes.[1,11] This shorter length of operation was due to more experience they had. Along with the increase in LLDN procedures performed in the RSCM, it is expected that the quality and duration of LLDN operation in the RSCM becomes better. In contrast to the length of operation, the average intraoperative bleeding in this study was 270 ± 182.87 ml, not much different from that reported by Ratner et al. of 266 ± 174.[1,11]

Warm ischemia time in kidney donor with a classic open surgery method is shorter than that in LLDN. However, research has shown that there are no negative effects on kidney function if the warm ischemia time is under 10 minutes.[6] In this study, the average warm ischemia was 9.37 ± 3.34 minutes, and it was expected to be better as they gain experience. In this study, there was one case complicated by multiple renal arteries. Multiple renal arteries can be found in 12-33% of cases of laparoscopic living donor nephrectomy. Several previous studies found that kidneys with multiple renal arteries are associated with high rate of vascular and urologic complications, such as thrombosis and ischemic ureters, so they are sometimes used as a relative contraindication.[12] However, some recent research suggests that kidney transplants with multiple renal arteries is safe enough to perform.[13-15]

In this study, after operation, donors who underwent LLDN were given epidural analgesia with bupivacaine 0.125 mg added with 10 mg morphine on average for 1.8 ± 0.63 days. With these interventions, the first day pain post-LLDN procedure assessed with VAS revealed an average value of 3 ± 1. Drain was placed on the donors for an average of 2.8 ± 1.2 days, with an average production 161 ± 100.49 cc, with a range of 10-350 cc. The majority of donors (90%) have been able to eat solid foods on the second day post- surgery. Similarly, in regard with mobilization, most (70%) of the donors had been able to run on the second day post-surgery.

Of 10 donors who underwent LLDN, none had conversion to open surgical methods, as well as deaths due to surgery. In this study, the majority of complications were urinary retention (n = 4), followed by surgical wound infection (n = 2) and one donor (n = 1) required postoperative transfusion. In his research, Ratner argued that transient thigh paresthesia is the most common complication (4.1%) followed by postoperative transfusion (3.5%) and wound infections (2.9%).[11] While the research conducted by Flowers et al (1997) suggested that the most common complications are bleeding (6%). Also in the same study they that reported urinary retention occurred in 1.4% of patients.[5]

Average length of stay in the hospital was 4.1 ± 1.37 days, while averagely in 9.0 ± 5.91 days the donors have been able to return to normal activities at home and averagely in 15.8 ± 7.94 days the donor was able to work again. Data presented by Ratner in his research showed surprisingly longer time to return to work, which was 28 ± 16.1 days.[1]

Recipients who underwent transplantation and received donor kidney had an average age of 52.1 ± 14.6 years. Average recipient with creatinine levels decrease within 48 hours after surgery was 60.5 ± 20.9%, with 3 recipients (30%) experienced delayed graft function (DGF). However, there was no recipient who required hemodialysis within the first week post-surgery.

Table 5. Comparison of perioperative parameters with those in other similar studies.

Parameters	This study Laparoscopic	Ratner et al[11] Laparoscopic	Flower et al[5] Laparoscopic
Patients (n)	10	323	69
Duration of operation (min)	321.9 ± 27.0	230 ± 29	226.3
Intraoperative bleeding (mL)	270 ± 182.87	266 ± 174	122.3
Warm ischaemia 1 time (min)	9.37 ± 3.34	ND	ND
Cold ischaemia time (min)	29.17 ± 15.23	ND	ND
Warm ischaemia 2 time (min)	52.26 ± 7.56	ND	ND
Length of hospital stay (hr)	4.1 ± 1.37	3.0 ± 0.9	2.2
Resume working (hr)	15.8 ± 7.94	28 ± 16.1	15.9

CONCLUSION

LLDN is a fairly safe procedure. LLDN also provides other benefits such as less intraoperative bleeding, less postoperative pain and lighter complications, shorter hospital stay and shorter time to return to work. In the end, the numbers of living kidney donors expected to increase. With a variety of advantages, LLDN procedure has potential to be developed to become primary choice in living donor kidney nephrectomy surgery.

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